DETAILED ACTION

1. This action is in response to papers filed 3/14/2008.

2. Currently Claims 1-2 and 39-41 are pending. Claims 3-38 have been cancelled.

3. The following rejections are newly applied. Response to arguments follows. Specifically Claims 40-41 were not interpreted as "at least 10 nucleic acid molecules" or "at least 25 nucleic acid molecules" in the last office action (12/04/2007). Further, the rejection of the claims over Wallace is newly applied.

4. This action is NONFINAL.

Withdrawn Rejections

5. The rejection of the claims made under 35 USC 112/Second paragraph made in section 5 of the previous office action is withdrawn.

6. The rejection of the claims made under 35 USC 112/Written Description made in section 6 of the previous office action is withdrawn.

7. The rejection of the claims made under 35 USC 102(b) and 35 USC 103(a) made in section 7-9 of the previous office action are withdrawn. Specifically the claims are being interpreted as consisting of a solid support onto which at least two nucleic acid molecules are bound of which 90% are either nucleic acid molecules that encode polypeptides of complex I, II, III, IV, or V of the mitochondrial respiratory chain or fragments of at least 15 nucleotides in length.

Claim Objections

8. Claim 2 is objected to because the claim specifically recite nonelected subject matter. The Claims require the analysis of the non-elected nucleic acid molecules. Applicant has elected for examination of the claim in so far as it requires ATP Synthase, F1 complex, 0 subunit; ATP Synthase, F0 complex, d subunit; ATP Synthase, F0 complex, C3 subunit; ATP Synthase, F1 complex, gamma polypeptide 1; ATP Synthase F0 complex subunit F in the reply to restriction (4/20/2006). Prior to allowance of this, the non-elected subject matter will be required to be deleted from the claim.

Claim Rejections - 35 USC § 102

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1-2 and 39-41 are rejected under 35 U.S.C. 102(e) as being anticipated by Wallace et al. (US Patent Application Publication US 2006/0099578 May 11, 2006) as evidenced by Wallace (US Patent 5494794 February 27, 1996, referred to as Wallace '794).

With regard to Claim 1, Wallace et al. teaches microarray consisting of probes for mitochondrial genes (abstract). Wallace et al. teaches that these arrays can contain subsets of probes drawn to mitochondrial energy (p. 2 paragraph 10). Wallace et al.

teaches that the microarray can be composed of mtDNA genes from NADH, Cytochrome b, Cytochrome c, ATP synthase 6, ATP synthase 8 (Table 1 and p. 3 paragraph 17). Therefore Wallace et al. teaches a microarray comprising nucleic acid molecules which are at least 90% of nucleic acid molecules that encode polypeptides of complex I, II, III, IV, or V (e.g. NADH, Cytochrome b, Cytochrome c, ATP synthase 6, ATP synthase 8). Wallace et al. teaches that the arrays can be designed such that genes related to OXPHOS are detected (p. 9 paragraph 64).

OXPHOS is composed of 5 enzyme complexes assembled from 13 mitochondrial DNA and 50 nuclear DNA subunits (as evidenced by Wallace '794 Column 1 lines 60-67). Wallace '794 teaches that OXPHOS is composed of Complex I (NADH); complex III (cytochrome c and cytochrome b); Complex IV (cytochrome c, COI, COII, COIII); and complex V (ATP synthase) (as evidenced by Wallace '794 Column 1 lines 60-67 and Column 2 lines 1-5). Therefore an array related to OXPHOS would include nucleic acid molecules of mitochondrial respiratory chain of complex I, III, IV, and V.

With regard to Claim 2, Wallace et al. teaches the array can include any number of genes related to mitochondrial function including ATP Synthase, F1 complex, 0 subunit; ATP Synthase, F0 complex, d subunit; ATP Synthase, F0 complex, C3 subunit; ATP Synthase, F1 complex, gamma polypeptide 1; ATP Synthase F0 complex subunit F (Table 3).

With regard to Claim 39, Wallace et al. teaches that the probes are 20-30 nucleotides in length (p. 4 paragraph 24).

With regard to Claims 40-41, Wallace et al. teaches the microarray can contain probes for all genes involved in mitochondrial biology or can contain probes for at least 10 genes or at least 25 genes (p. 6 paragraph 42).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 1, 39-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wallace et al. (US Patent 5494794 February 27, 1996) in view of Lockhart et al. (US Patent 6040138 March 21, 2000).

With regard to Claim 1, Wallace teaches probes to detect mutations in mitochondrial DNA (abstract). Wallace teaches defects in OXPHOS may play a role in the pathogenesis of Alzheimer's disease and Parkinson's disease (column 1 lines 39-41). Wallace teaches OXPHOS is composes of 5 enzyme complexes assembled from 13 mitochondrial DNA and 50 nuclear DNA subunits (Column 1 lines 60-67). Wallace 'teaches that OXPHOS is composes of Complex I (NADH); complex III (cytochrome c and cytochrome b); Complex IV (cytochrome c, COI, COII, COIII); and complex V (ATP synthase) (Column 1 lines 60-67 and Column 2 lines 1-5). Wallace teaches the design of probes for the detection of these regions (Column 7 lines 25-45). Therefore Wallace teaches probes related to OXPHOS which would include nucleic acid molecules of mitochondrial respiratory chain of complex I, III, IV, and V.

With regard to Claim 39, Wallace teaches that these probes can be 40 nucleotides in length (Column 7 lines 39-41).

Wallace et al., however, does not teach placing the mitochondrial respiratory chain probes on an array.

Lockhart et al. teaches placing oligonucleotides probes onto an array (solid support) to detect expression (Abstract).

With regard to Claims 40-41, Lockhart et al. teaches that the array of probes can comprise up to 100 different oligonucleotide probes (abstract).

Therefore, it would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to bind the probes of mitochondrial respiratory chain as taught by Wallace onto the array taught by Lockhart et al. with a reasonable

expectation of success. The ordinary artisan would want to incorporate the probes onto the array because Lockhart et al. teaches that probes on an array can be used to detect a large number of different target nucleic acids at once and determine the relative abundance of each in a sample (Column 2 lines 35-55). Therefore the ordinary artisan would be motivated to place the probes onto an array in order to detect quickly expression changes in a large number of probes in order to quickly determine changes in the OXPHOS.

Conclusion

13. No claims are allowed.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine Salmon whose telephone number is (571) 272-3316. The examiner can normally be reached on Monday-Friday 8AM-430PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached on (571) 272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

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Business Center (EBC) at 866-217-9197 (toll-free).

/Katherine Salmon/
Examiner, Art Unit 1634

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